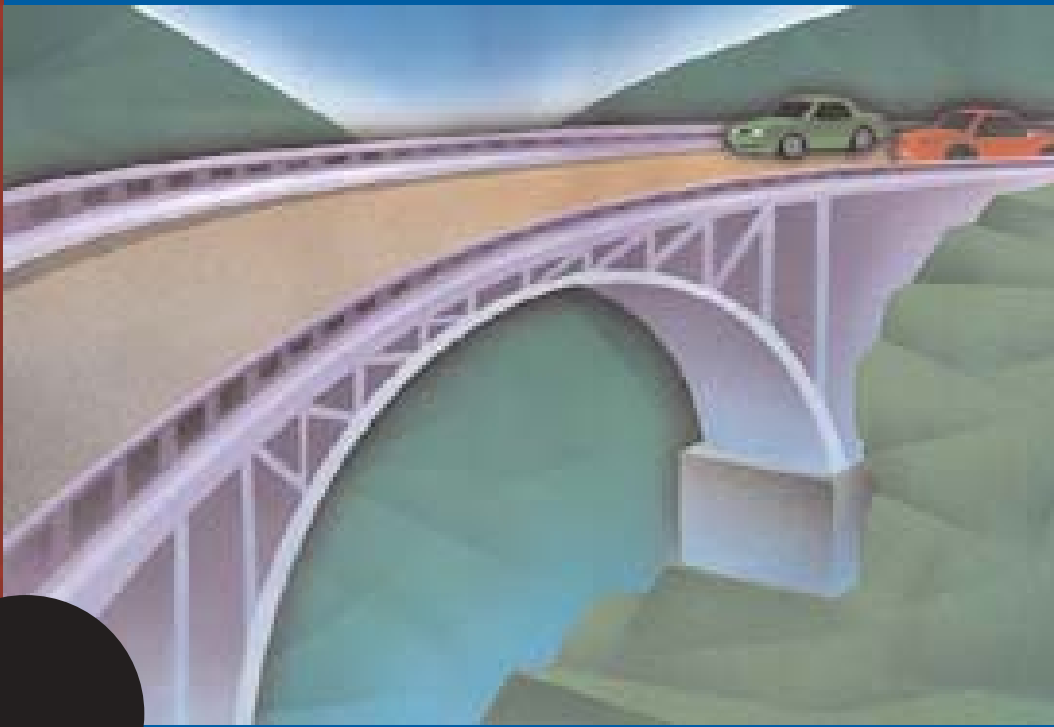
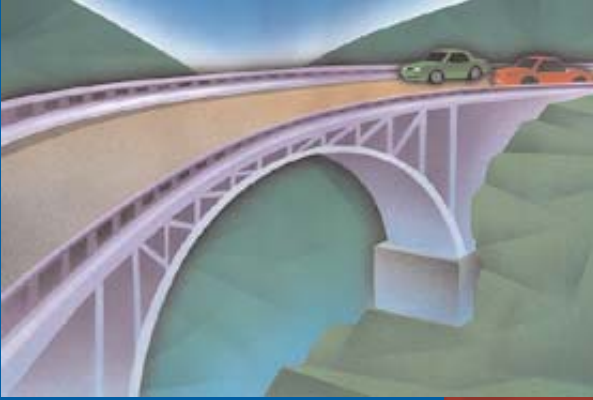


ASSET MANAGEMENT FOR BRIDGES





Asset management is the science of deciding when, where, and how to spend maintenance and preservation and improvement resources in the most cost-effective way possible.

Asset Management for Bridges

What is Asset Management?

Until ten years ago, there was no such thing as a comprehensive computer-based bridge management system. States did their best to maintain and preserve bridges, but billions of dollars were spent each year without benefit of a system to analyze all the engineering, economic, and business practice factors to support the best possible decisions.

Over the past decade, however, there's been a revolution in the way that States manage bridges; and transportation departments all over the Nation are now getting more bridge for their buck through the use of asset management.

Put simply, asset management is the science of deciding when, where, and how to spend maintenance and preservation and improvement resources in the most cost-effective way possible. It also involves measuring performance so that good decisions can be repeated in the future and bad ones can be avoided.

Every State has a growing list of needs when it comes to bridge management, and engineers and project managers often find themselves asking questions such as:

We have a number of bridges that are functionally obsolete—how do we know which ones to replace first?

"Our bridge infrastructure is older and more worn out than ever, yet our budget is more stretched than ever—how can we be sure we're spending our money in the right places?"

"How can we extend the life of our bridges so that we don't have to spend as much money on maintenance in the future?"

These kind of questions are not easily answered, especially when States are continually expected to do more work with less budget and fewer people.

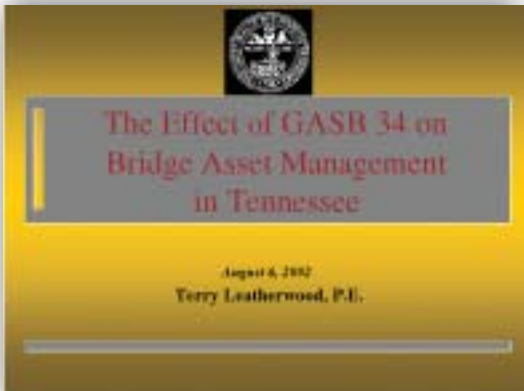
But asset management, in the form of a bridge management system such as Pontis, can help States allocate their resources most effectively and make programming decisions that will save money in the long term.

What Tools are Used for Bridge Management?

The technology to perform asset management for bridges has come a long way in recent years. One of the most essential tools is a software program called Pontis, whose most current version is 4.1. Pontis accumulates and analyzes bridge data to give decision-makers a better idea of project costs, which projects should be done in what order and with which materials, and the best ways to do preventive maintenance to keep future costs down.

In What Other Ways Can Asset Management Help Our Bridge Program?

The Pontis bridge management system can offer users greater accountability by tracking what is bought with public funds, how spending decisions are made, and analyzing what has been accomplished.



It can also help meet the requirements of GASB Statement No. 34, a new financial reporting process for States that mandates the recording of long-lived infrastructure. The requirements can be more easily met when a bridge management system has the details of bridge value, depreciation, and preservation readily available.

How are the Principles and Tools of Asset Management Being Made Available to States?

The Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO) have partnered to spread the word about bridge management systems and how they can help States make better, more cost-effective bridge maintenance and preservation decisions. AASHTO has established a Task Force and released several publications on the subject, including the AASHTO Guide to Asset Management. FHWA has developed workshops and has been meeting with State representatives all over the Nation. And there is now a National Highway Institute (NHI) training course on the use of Pontis software.

A community of Practice for Highway Asset Management is managed cooperatively by AASHTO and FHWA. Registered users can participate in on-line discussions, post papers and presentations, and receive email abstracts and links to new postings. The email notifications can be customized by completing a user profile. <http://assetmanagement.transportation.org>

But the best way to make asset management the state-of-the-practice throughout the country is through word of mouth. States that already use asset management must work with each other to develop partnerships and share ideas and research methods with States that have not yet embraced the concept.

Report on Bridge Management System Workshops, 2002

Bridge Management Workshop Events and States that Participated

Nashville, TN	August 6-7	TN, KY, NC, SC, GA
Tallahassee, FL	August 13-14	FL, PR, AL, MS, LA
Oklahoma City, OK	August 27-28	OK, AR, TX, NM

[photo of attendees at long table]

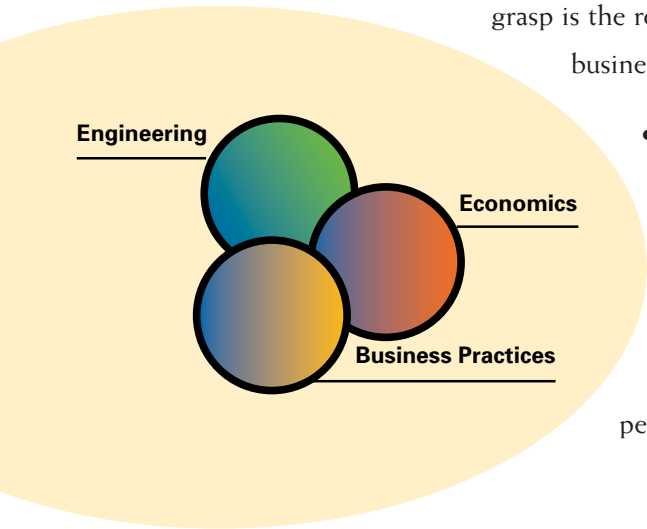
[photo of 5 men at table]

The essentials of asset management were presented by Michael Fraher, Infrastructure Team Leader for the Southern Resource Center. This presentation focused on the major elements of asset management processes. Roundtable discussions at each workshop covered how States are organized to perform the actions in their bridge asset management programs. Each State provided a summary of its bridge assets, the number of bridge projects it undertakes each year, and the approximate annual funding it allocates to bridge preservation and replacement.

Essential Elements of Asset Management

The first essential element of asset management is the goal; strategic plans with measurable goals form the basis for all other elements of asset management. These strategic goals are long term, and they serve as the foundation for policy-making, funding allocations, and short-range programming decisions. Once goals are established, the asset management process can begin.

Another key asset management element that all participants were able to grasp is the relationship among engineering, economics, and business practices. These include:



- **Engineering**—designs, materials, construction quality, and preservation
- **Economics**—life-cycle cost analysis, optimization, return on investment, and financial strategies
- **Business Practices**—strategic planning, performance measures, data systems

Figure 1: Engineering, economics, and business practices overlap in asset management.

And a third essential element of asset management is determining the framework in which data is collected, decisions are made, alternatives are developed, and plans are implemented and monitored. The framework should also include external factors and constraints such as policies and budgets, and ways to receive feedback at every stage of the asset management process.

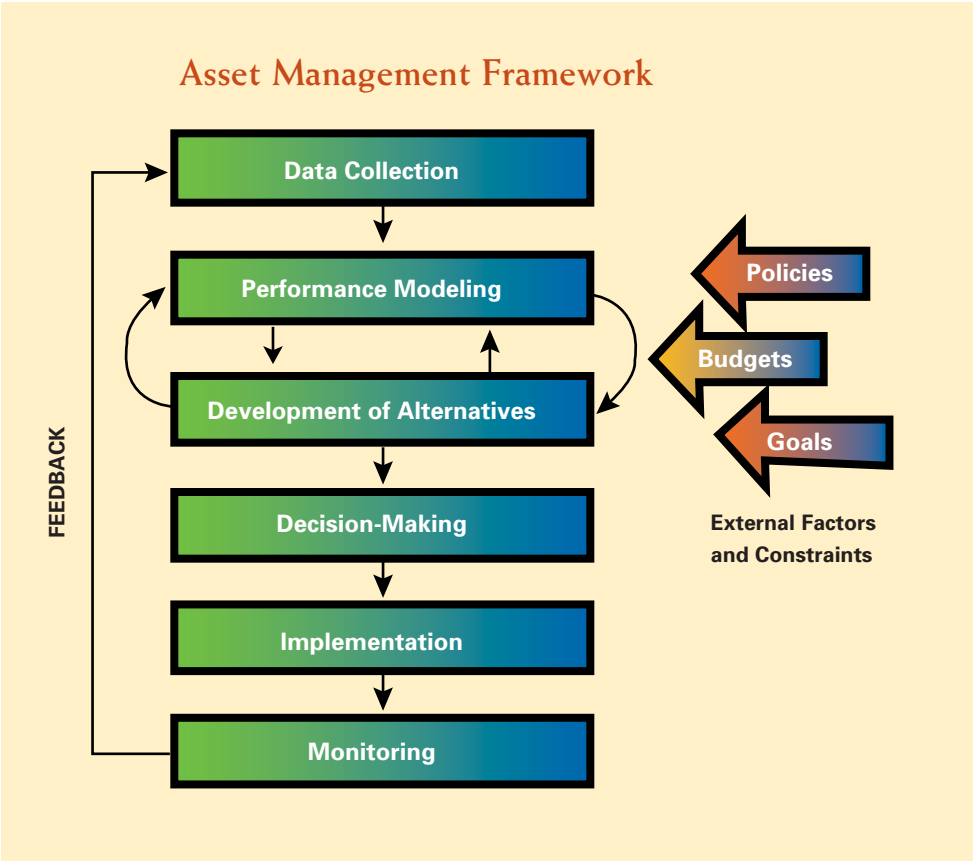


Figure 2: Having a framework in place for developing and executing plans is essential to making an asset management system work.

How Bridge Management Functions Vary from State to State

During the roundtables, we discussed the typical processes in bridge asset management to identify the organizational assignments of responsibility. A bridge management system such as Pontis helps to bring these disparate functions together to work more efficiently. The modular design of Pontis follows the asset management framework seen in Figure 2. When applied in a networked configuration, it can accommodate assignments of the management tasks across multiple organization elements.

For example, in Oklahoma, the State's bridge department does load ratings, maintenance contracts, Highway Bridge Replacement and Rehabilitation Program (HBRRP) project design, and National Bridge Inspection Standards (NBIS) management. Meanwhile, Oklahoma's districts perform routine maintenance and NBIS inspections. And a variety of functions combine to handle the State's other bridge management tasks. Pontis improves the efficiency of these disparate functions by bringing them together in one organizational structure.


Management Tasks	North Carolina	Oklahoma	New Mexico	Arkansas	Texas
NBIS Management	Maintenance	Bridge	Bridge	Bridge	Bridge
NBIS Inspections	Maintenance	Districts	Districts	Maintenance	Districts
Load Rating	Maintenance	Bridge	Bridge	Bridge	Multi-functional
Load Posting MGT	Maintenance	Multi-functional	Multi-functional	Bridge	Multi-functional
Local Bridge Program	Maintenance	Multi-functional	Multi-functional	Other	Multi-functional
Scope Contract Rehab	Multi-functional	Multi-functional	Multi-functional	Multi-functional	Multi-functional
Maintenance Contracts	Multi-functional	Bridge	Multi-functional	Multi-functional	Districts
Maintenance Routine	Districts	Districts	Districts	Districts	Districts
HBRRP project selection	Maintenance	Multi-functional	Programming	Programming	Multi-functional
HBRRP project design	Multi-functional	Bridge	Bridge	Bridge	Multi-functional
STIP development	Multi-functional	Planning	Districts	Programming	Districts

Figure 3: Different States have an array of management tasks and organizational responsibilities that can be streamlined with the help of the Pontis bridge management system.

The Scope of Bridge Management

After discussing the details of the bridge management process, participants completed an additional spreadsheet listing the bridge assets, actions, and funds of each State within the Southern Resource Center region. This data was compiled to stress the importance of what bridge engineers and managers do and what it is they are accountable for—90,000 bridges and an annual budget exceeding a combined \$1.3 billion per year.

As governments become more concerned with their accountability for public assets and the funds used to preserve them, the need for new scientific approaches to asset management is being recognized.

SRC State	Number of State owned bridges	Total bridges	Number of annual replacements	Number of annual rehabilitations	Number of annual repairs	Millions of dollars, all sources
Alabama	5,400	15,600	35 + local	2	150 + local	\$ 96
Florida	6,258	11,200	35 + local	minimal	150	\$ 250
Louisiana	7,900	15,000	120	10		\$ 120
Mississippi	5,500	16,700	175	2		\$ 90
Puerto Rico	2,216	2,216	14	6		\$ 41
Arkansas	7,000	12,800	80	2	12	
Oklahoma	6,674	22,902	100	2	25	\$ 100
Texas	32,500	49,000				
New Mexico	3,670	4,190	6	6	70	\$ 25
Tennessee	8,000	19,560	136	60	120	\$ 130
Kentucky	9,000	14,000		3	70	\$ 60
North Carolina	18,900	19,500	180	15	300	\$ 160
South Carolina	8,255	9,106	40	7	220/20 paint	\$ 100
Georgia	6,000	14,500	60	250	300	\$ 180
SRC Totals	127,273	226,274	911	365	747	\$1,352

Where Pontis is Used to Perform Bridge Asset Management

40 States currently license the Pontis software. Alabama, Kentucky, and North Carolina are the only SRC States not using Pontis. However, these states do have data systems and processes in place that support most of the essential elements of asset management.

The remaining SRC States license Pontis and all but Louisiana currently perform element-level condition inspections. Louisiana has developed some fuzzy element data to allow Pontis to complete a network level analysis of functional needs. Florida and Oklahoma are developing their cost and deterioration inputs and are updating their processes to integrate Pontis results in the near future.

Arkansas and Tennessee have migrated their data to Pontis 4.0 and are now using Pontis in the field offices for inspection. Puerto Rico licensed Pontis in April of 2002 and is performing element-level inspections and using Pontis as their bridge inventory database.

South Carolina is the one State in the SRC area that has fully integrated Pontis results into its decision-making process, network analysis, and preliminary project identification. The leadership has moved from bridge design to bridge maintenance operations, and the selection criteria has advanced from a simple application of the Federal sufficiency rating to a systematic mix of

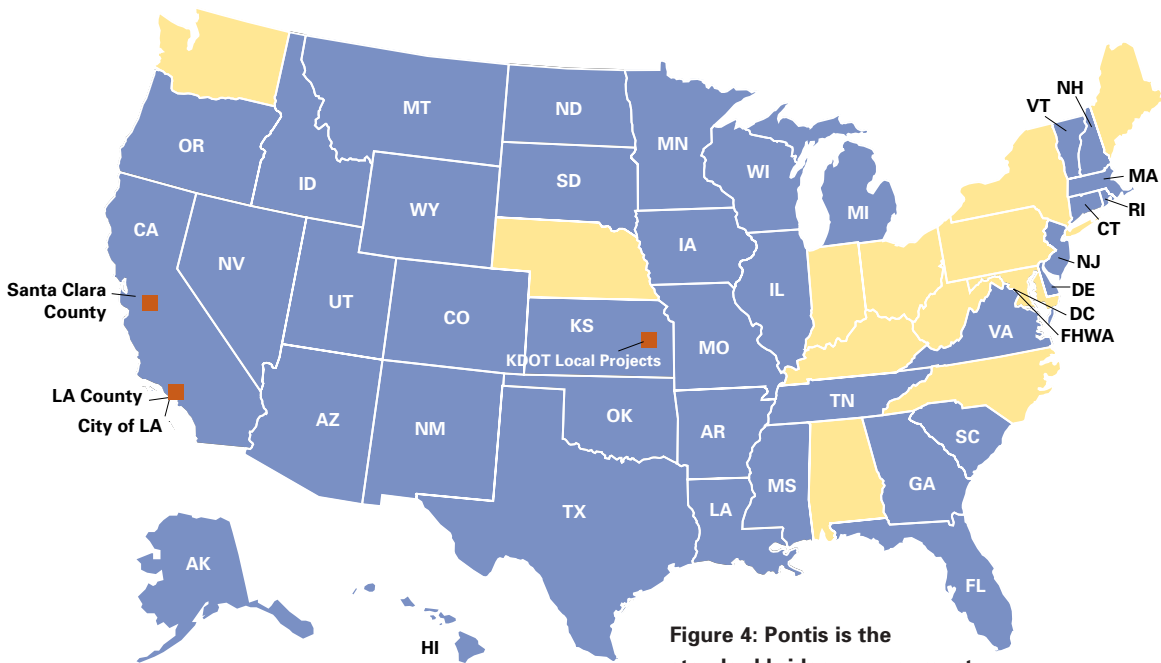



Figure 4: Pontis is the standard bridge management tool in most States and several counties and cities in the United States

engineering, economics, and business practices—all organized using Pontis. In 2001, 89 percent of SCDOT’s bridge project selections originated from the bridge management system. South Carolina will be updating to Pontis 4.0 over the coming year.

North Carolina discussed its progress in applying new data technologies to its bridge management processes. Other states reported on similar efforts to digitize all bridge information including photos sketches and as-built plans and load ratings. An innovative application of voice  gnition technology is currently being developed for NCDOT by AERA, Inc.

NC Bridge Technology Improvements	NCDOT—Bridge Inspections
<ul style="list-style-type: none"> • Updates to present BMS • Digital Conversion of bridge records • Migration from Mainframe to Oracle Database • Document Management System Implementation (ProjectWise) • Electronic Inspection Application • VIPIR Pilot Project—AERA, Inc. 	<p>VIPIR Project</p> <p>The objective is to develop a fully functional data collection tool for one bridge inspection team (2 inspectors)</p> <p>Development Approach</p> <p>Phase I— Inspection Benchmarking and Data Analysis</p> <p>Phase II— Application Development</p> <p>Phase III— Field Testing</p> <p>Phase IV—VIPIR System Demonstration</p>

Figure 5: North Carolina’s approach to improving bridge technology and inspection methods.

Preventive Maintenance

Each of the roundtables devoted time to discussion of preventive maintenance. Brian Summers of Georgia, George Conner of Alabama, and Garland Land of Arkansas outlined the major work items they are currently applying. There was discussion of the change in FHWA policy to allow HBRRP funds for preventive measures on non-deficient bridges. FHWA's guidance recommended that the systematic bridge management systems be used to justify HBRRP funds by predicting extended service life and lower life-cycle cost. Many of the SRC States plan to use some portion of HBRRP to supplement their State bridge maintenance.

The main idea of asset management is balancing preservation and improvement decisions to maximize total network benefits. In theory, forgoing preservation of existing assets while expanding the asset inventory is a non-sustainable policy. Florida has recognized this in its current strategic plans by setting performance measures for system preservation and setting preservation priorities above capacity improvements.

Final Notes and Contact Information

Making asset management succeed on a nationwide basis will take leadership and a sustained commitment on the part of elected officials and executive leadership, along with a commitment of resources and the State and Federal level. Spending funds now on the proliferation of asset management will save money in the future.



All 15 State Highway Agencies of the SRC participated in the BMS roundtables. The AASHTO BridgeWare taskforce was represented in Florida by Bill Robert of Cambridge Systematics and in Oklahoma City by Paul Jensen of the Montana Department of Transportation.

For more information on asset management, bridge management systems, and Pontis, contact:

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